

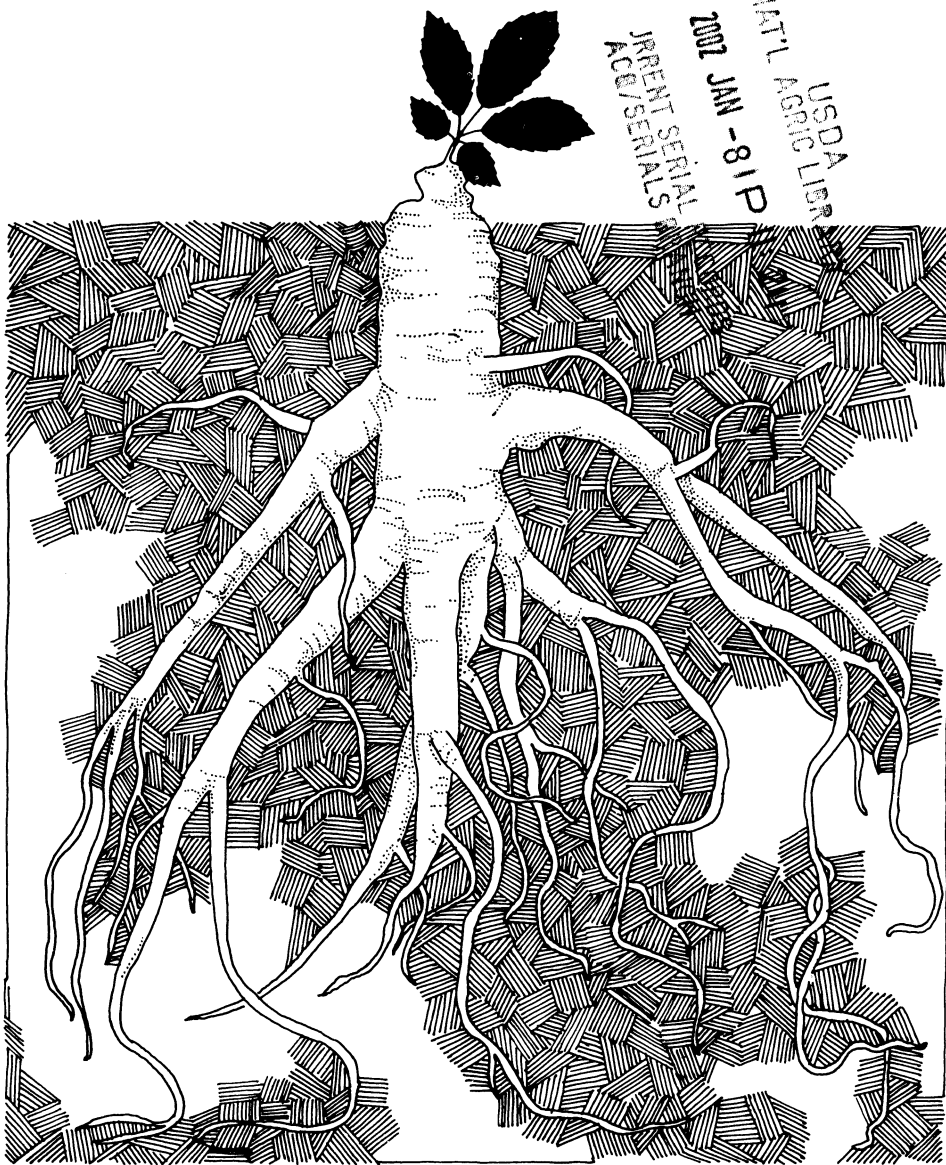
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# Growing Ginseng

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On January 24, 1978, four USDA agencies—Agricultural Research Service (ARS), Cooperative State Research Service (CSRS), Extension Service (ES), and the National Agricultural Library (NAL)—merged to become a new organization, the Science and Education Administration (SEA), U.S. Department of Agriculture.

This publication was prepared by the Science and Education Administration's Federal Research staff, which was formerly the Agricultural Research Service.

# GROWING GINSENG

By Llewelyn Williams (retired) and James A. Duke, SEA botanist<sup>1</sup>

American ginseng<sup>2</sup> is a fleshy-rooted herb native to cool and shady hardwood forests from Quebec and Manitoba south to northern Florida, Alabama, Louisiana, and Arkansas. Wild ginseng has been harvested for many years and is cultivated commercially for its root, both in its natural range and in the Pacific Northwest.

American ginseng shows variations in characteristics, particularly in the roots. Western types usually have long, thin roots of undesirable qualities. Plants from the northern part of the country, particularly Wisconsin and New York, are the most desirable for export, furnishing roots of good size, weight, and shape, and are generally considered the best breeding stock. Cultivated roots usually are heavier and more uniform than wild roots, although they command a lower price in the market. The market price of the cured root is based on color, maturity, size, and form.

Ginseng is valued by some Chinese and Koreans, who believe the dried

roots have stimulant properties. Increasingly, it shows up in "health food" stores here in the United States. Recent studies have shown that some ginseng does contain biologically active saponins. In a 1971 Korean symposium on the closely related Korean ginseng, several positive attributes were suggested; for example, increasing mental and physical efficiency, stimulating protein synthesis and basal metabolic rate, protecting against physical and chemical stress, lowering blood sugar and cholesterol levels, and regulating liver metabolism. One ingredient, protopanaxatriol, was said to stimulate the CNS (central nervous system); another, protopanaxadiol, was said to depress the CNS. If proved, these suggestions would explain the increasing popularity of ginseng. American scientists have apparently not verified these suggestions for American ginseng.

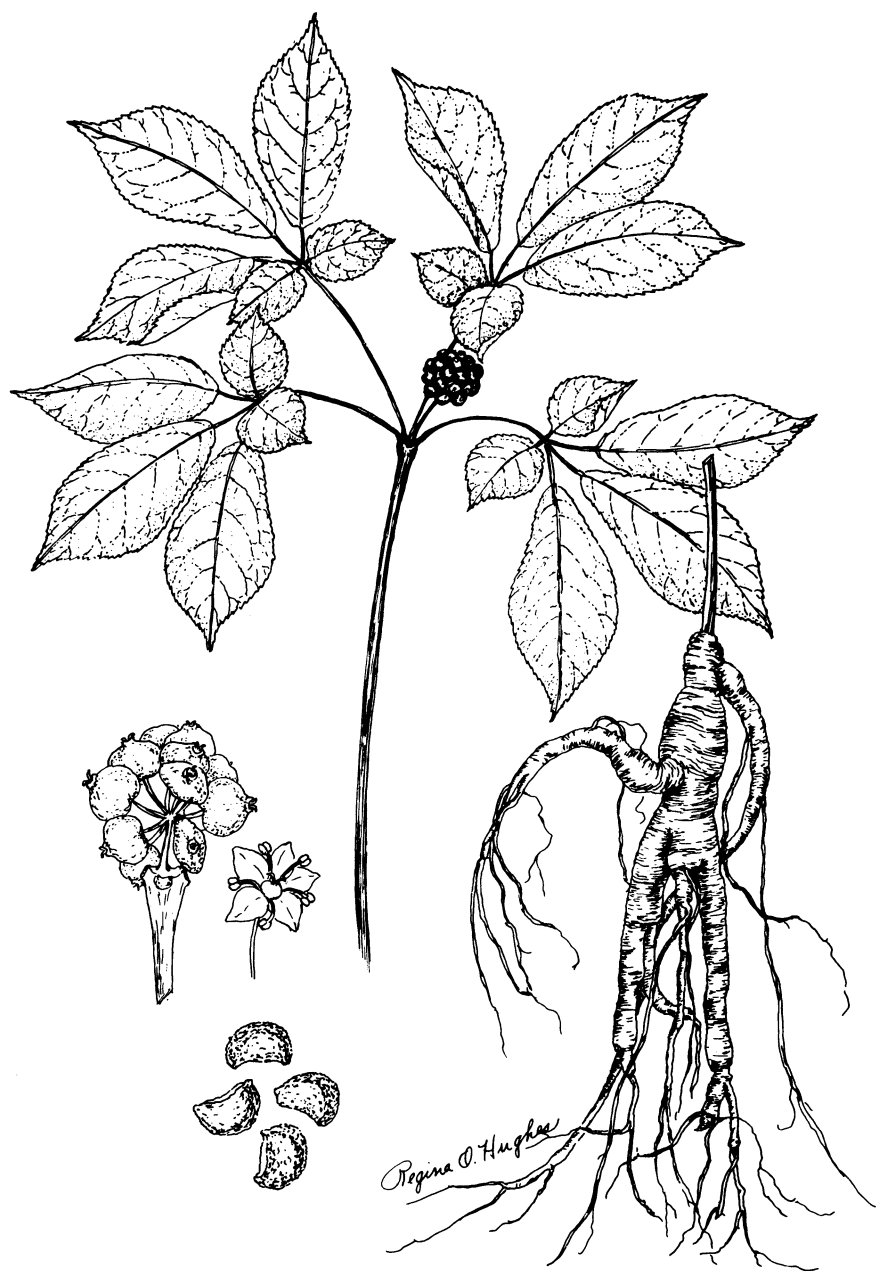
## DESCRIPTION

Ginseng grows about 1 foot tall. Leaves of mature plants usually consist of five ovate leaflets. It blooms in midsummer; the flowers are greenish yellow, borne in clusters. The fruit is

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<sup>2</sup>*Panax quinquefolius* L.



Branch, root, flower, berries, and seeds of American ginseng.

a bright crimson berry, containing one to three wrinkled seeds the size of small peas. Mature root is spindle shaped, 2 to 4 inches long, and up to 1 inch thick. In plants upwards of 5 years old, the root is usually forked, with prominent circular wrinkles. Roots reach marketable size when 5 to 7 years old. They are dug, carefully washed to remove adhering soil, and dried. Only whole roots are acceptable in the trade.

Best quality root of proper age breaks with a somewhat soft and waxy fracture. Young or undersized roots dry hard and glassy and are less marketable.

An analysis of 4-year-old roots of Korean ginseng showed they contained per 100 g: 338 calories, 10.0 percent water, 12.2 g protein, 70.0 g carbohydrate, 4.2 percent fiber, 1.0 g fat, 2.6 percent ash, <100 IU (International Units) vitamin A, <1.0 mg (milligram) vitamin C, 0.10 mg vitamin B-1, 0.108 mg vitamin B-2, 4.70 mg niacin, 234 mg calcium; 4.90 mg iron, <1.49 IU vitamin E, 0.48 mg vitamin B-6, 0.0506 mg folic acid, 0.31 mcg (microgram) vitamin B-12, 216 mg phosphorus, <5.0 mcg iodine, 98.0 mg magnesium, 1.04 mg zinc, 0.62 mg copper, 0.00772 mg biotin, and 0.69 mg pantothenic acid.

## PLANT MATERIALS

Ginseng is grown from seeds, seedlings, or roots. Plants free from blight or mildew and growing spontaneously in woodland may be transplanted to prepared beds.

Ginseng requires 5 to 7 years to mature from seed. By planting separate beds of seeds, 1-, 2-, and 3-year-old seedlings, and roots, the first crop

can be scheduled in 2 to 4 years after planting. Each year after the first harvest, another crop will mature.

## Seeds

Plant seeds in the spring as soon as the soil can be tilled. Only scarified or partially germinated seeds should be used for planting. They are planted 8 inches apart each way in permanent beds, or 2 by 6 inches apart in seedbeds. Cover seeds with 1 inch of forest soil, or well-rotted hickory or basswood sawdust; do not use pine or oak sawdust.

Seeds ripen in the fall but may not germinate for 18 months. Do not allow ripe seeds to dry out. Store them in a cool, moist place. Use woodland soil, sand, loam, or sawdust as a storage medium.

Use of seeds instead of seedlings may prevent the introduction of disease to new plantations. This is also the least expensive way to start a plantation but requires a longer period until harvest.

Some growers plant the seeds when they ripen in September and cover the beds with leaf mold or mulch. They keep the beds covered until spring when the seeds begin to sprout.

## Seedlings

Ginseng seedlings are more expensive than seeds, but a crop grown from seedlings can be harvested 2 or 3 years sooner than a crop propagated from seeds. Several firms sell 1-, 2-, or 3-year-old seedlings. Three-year-old seedlings produce seed during the first fall after planting, which may be used for planting future crops. Set seedlings in per-

manent beds, 8 inches apart each way. Closer spacing tends to increase disease in the plantation.

## **Roots**

Roots may be set any time from October to April, after soil has been tilled. Fall planting, however, is usually preferred. Plant roots 2 inches below the bed surface and 8 inches apart each way. When roots are not available in woodland, beginners should purchase them from reputable growers. Roots grow more rapidly when not permitted to seed.

## **CULTURE**

Ginseng may be grown directly in woodlots or in lath sheds with partial shade—an environment similar to the plant's natural habitat. Plants thrive best in loamy soil, such as found in oak and sugar maple forests in the North. Shade is essential.

## **Soil**

Ginseng grows naturally on slopes of ravines and in well-drained sites where soil is formed from acid leaf mold of hardwood forests. The soil should be naturally dry and fairly light, and in condition to grow good vegetables without the addition of strong manure. By proper treatment, almost any fairly good soil can be conditioned for ginseng growing. The addition of woodland soil gives best results. Very sandy soil tends to produce hard, flinty roots of inferior quality.

For seedbeds, break up soil to a depth of 6 to 8 inches, and remove all weeds, grasses, and roots. Mix 1-to-1 with fiber-free woodland soil. If the soil is inclined to be heavy, add

enough sand so that mixture will not harden after heavy rain.

## **Beds**

Selection of proper location, preparation of soil, and good drainage are important in planting ginseng. The best site for beds is a hardwood forest, with tall trees to provide reasonably dense shade, and with little undergrowth. Similar drainage and shade conditions should be maintained when growing ginseng in lath sheds.

Make beds 4 feet wide with walkways between them. For root planting, work the beds up to 12 inches deep. For seeds and seedlings, work the beds only 8 inches or so deep to prevent settling. Mound the center of permanent planting beds to provide space for more plants and, if located on flat ground, to facilitate good runoff of water. Slope the walkways so that they will drain water from the beds during heavy rains.

## **Shade**

Ginseng needs 75 percent shade during the summer, even more farther South, and free circulation of air. Shade can be provided in lath sheds or by trees in a forest planting. Laths should run north to south to provide alternating sun and shade to the plants. Do not use burlap or muslin; they interfere with air circulation.

## **Cultivation**

Ginseng requires relatively little cultivation. The beds should be kept free of grass and weeds, and the soil should be scratched with a light implement whenever it shows signs of

caking. One active man can easily take care of about 2 acres of ginseng.

## **Mulching**

A winter mulch over the crowns is essential to prevent heaving by frost. A 4- or 5-inch layer is ample in the most severe climate; less is needed in the South. Spread mulch when frost is imminent and remove it in the spring before the first shoots appear. Light mulching to retain moisture during dry weather is also advisable.

Forest leaves or light brush, held in place with poultry netting, makes the best mulch. Cornstalks stripped of husks, bean vines, cowpea hay, and buckwheat straw are also suitable if they do not contain weeds, seeds, or other materials attractive to rodents.

## **Fertilizer**

Many growers are opposed to excessive use of fertilizers. Heavy use of barnyard and chemical fertilizers lessens the resemblance of cultivated ginseng to the wild root. Overmanuring also forces growth and lowers the resistance of ginseng to the attacks of disease.

Some growers fertilize with leaves or old sawdust of hardwood trees, or with ground-up, rotted hardwood. Others prefer woodland soil or rotted leaves 4 to 6 inches deep, spaded to a depth of about 8 inches with fine raw bonemeal well worked in and applied at the rate of 1 pound per square yard.

## **Protection**

Rodents can be the ginseng farmer's worst enemy. Fence beds to keep out animals and to discourage theft.

Protect the beds from subterranean rodents with boards or close mesh wire netting set 12 to 18 inches in the ground. Others may be controlled with traps.

## **HARVEST**

A ginseng crop matures in 5 to 7 years. Generally the roots are dug in mid-October of the fifth to seventh year. Good roots are about 4 inches long, 1 inch thick below the crown, and average 1 ounce in the fresh state. Older roots, when properly cured, bring the highest prices.

## **Digging**

Dig the roots with their forks intact. Carefully free them of adhering soil so as to preserve their natural color and characteristic circular markings. Do not scrape or scrub them. The market value of the product is based, in part, on wholeness and appearance.

Some growers replant young and undersized roots or heel them in until spring planting.

## **Drying**

Dry the roots in a well-ventilated, heated room. Drying is usually started between 60° and 80° F, and after a few days the temperature is increased to 90°.

Another method, adopted by some growers, is to start drying between 100° and 110° and when roots wilt, lower the temperature to 90°.

Spread the roots thinly on lattice or wire-netting shelves. Turn them frequently, but handle with care to avoid marring the surface or breaking the forks.

Roots more than 2 inches in



diameter will need to be dried for about 6 weeks; smaller roots may be properly dried in less time.

Throughout the curing process, especially during damp weather, care should be taken to see that the root does not mold or sour. Do not over-heat, as it tends to discolor the surface and spoil the texture of the root.

When well cured, the roots should be stored in a dry, airy, rodentproof place until ready for market.

## **Yield**

The yield of cultivated ginseng depends on the condition under

which the crop is grown and the experience and skill of the grower. The estimated weight of dried 6-year-old root from a bed 4 by 16 feet is 10 pounds. Yields of dried roots from a well-managed planting should average about 1 ton per acre although greater yields are often reported. Crops from forest plantings are reported to be about half those obtained in lath sheds, but production costs are also much less.

The value of the crop depends on the market at time of harvesting. There are several firms in the United States that buy ginseng.

The market for ginseng root is limited. It is estimated that 95 percent of the ginseng collected or grown in the United States is exported to the Orient. During the 3-year period, 1969 through 1971, such exports averaged only 158,980 pounds of dried root per year.

The prices paid for ginseng are high and fluctuate greatly. During the same 3-year period, export price-per-pound averages were \$38.12, \$30.83, and \$34.51.

A recent Foreign Agriculture Service report indicated that at \$12.6 million in 1975 total U.S. ginseng exports were up to 13.5 percent from the \$11.1 million of 1974. Annual U.S. production at that time was estimated at 250,000 pounds, 75 percent of it cultivated and 25 percent harvested from the wild. The producer was said to reap only \$20 per pound, and average yields were around 1,500 pounds per acre. If only \$5 per pound is profit, and the plant is harvested only every 5 years, that amounts to only \$1,500 per acre per year, much less than some of the exaggerated claims seen in advertisements in popular magazines.

High initial cost of planting stock, susceptibility to diseases, long maturing period, and a limited market indicate ginseng farming should be approached conservatively. Since yields of dried root average about 1 ton per acre, 100 to 200 acres of mature ginseng could easily supply the total market for 1 year.